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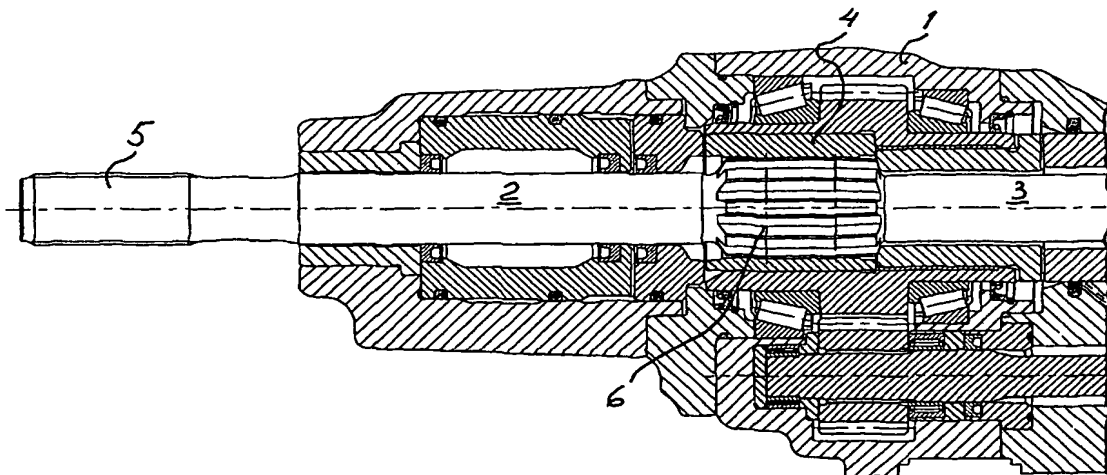
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(54) Title: IMPACT ADAPTER FOR TRANSFER OF IMPACTS AND ROTATION FROM AN IMPACT ROCK DRILLING MACHINE TO A DRILL STRING



(57) Abstract: Impact adapter for transfer of impacts and rotation from an impact rock drilling machine to a drill string comprising a first end (5) for connection to a drill string and a second end provided with ridges (7) and interposed grooves (8) for transfer of rotation. The grooves (8) at the end (9) directed away from the first end (5) of the impact adapter (2) are widened in the direction away from the first end (5).

Impact adapter for transfer of impacts and rotation from an impact rock drilling machine to a drill string

The present invention relates to an impact adapter for transfer of impacts and rotation from an impact rock drilling machine to a drill string.

In previously known impact adapters ridges and grooves at the rear end of the impact adapter are used for transferring torque to a drill string from a driver journalled in the rock drilling machine. Because of manufacturing tolerances one has a certain play between the impact adapter and the driver in order to allow the axial movement caused by the impacts of the rock drilling machine against the impact adapter. This results in the impact adapter coming more or less obliquely in the driver. This oblique position in combination with the relative axial movement between the driver and the impact adapter often gives rise to breakage of one or more of the ridges adjacent the rear end of the impact adapter.

The present invention, which is defined in the subsequent claims, aims at decreasing the problem with ridge breakage by decreasing the surface pressure between impact adapter and driver. This is achieved by making the grooves between the ridges on the impact adapter wider at the rear end of the impact adapter.

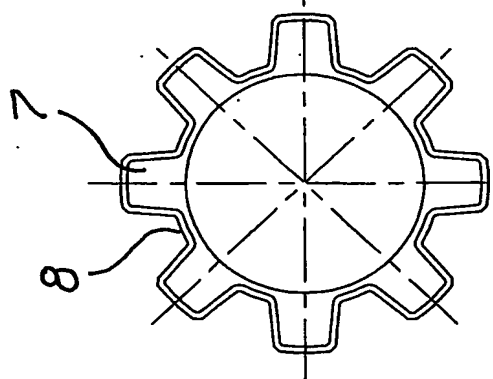
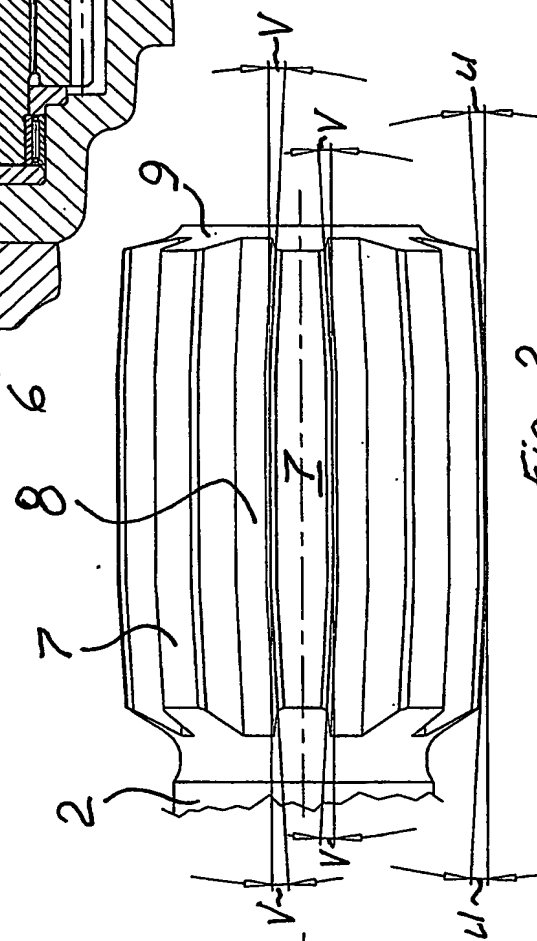
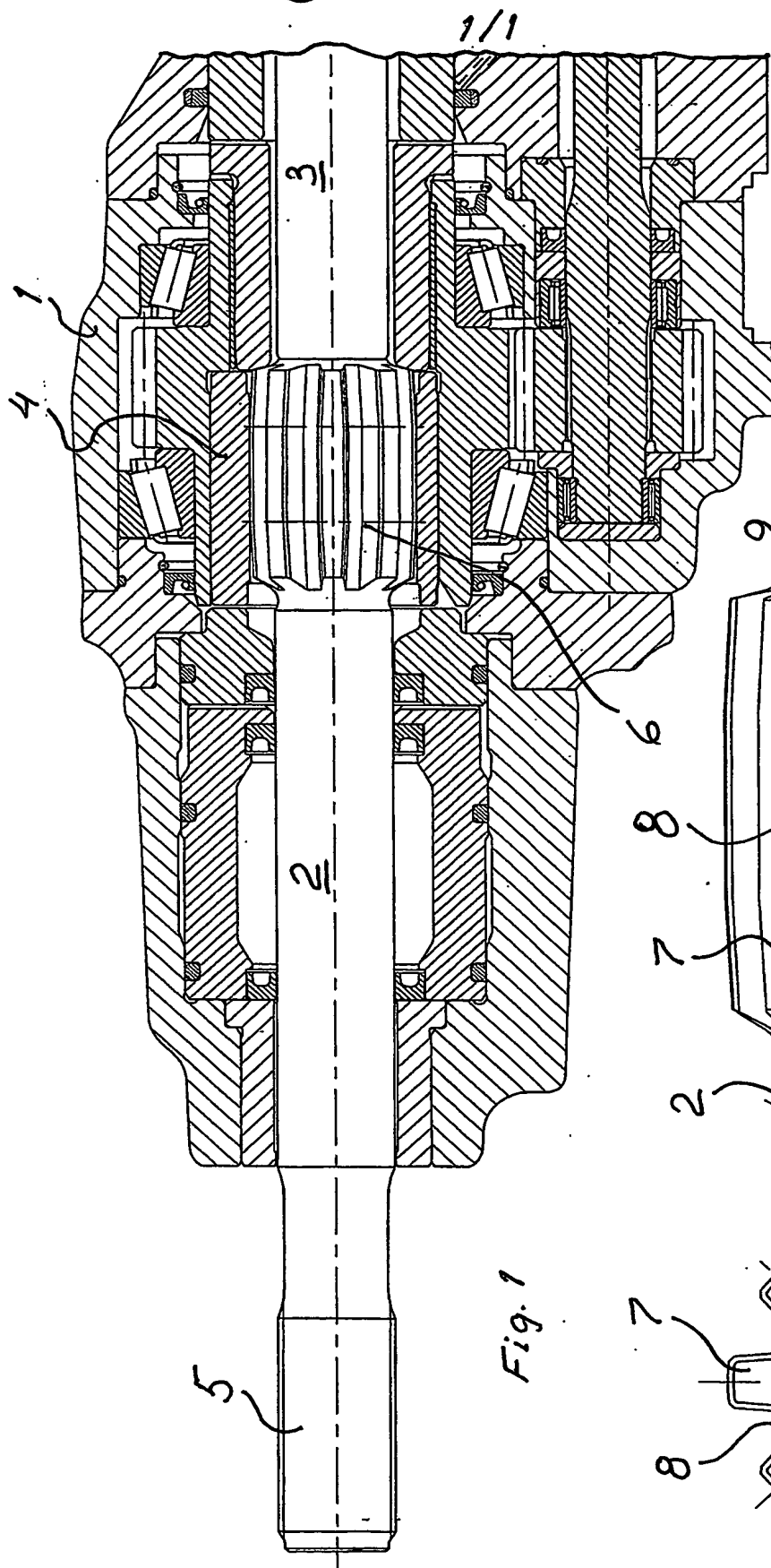
An embodiment of the invention is described below with reference to the appended drawing in which fig 1 shows a section through a part of an impact rock drilling machine. Fig 2 shows a part of the impact adapter according to the invention. Fig 3 shows a view from the right in fig 2.

The rock drilling machine shown in the drawing comprises a machine housing 1, consisting of several connected parts, in which an impact adapter 2 is displaceably arranged in a driver 4. The driver 4 is rotatable by means of a not shown motor. The driver transfers torque to the impact adapter 2 via splines 6 comprising ridges 7 and interposed grooves 8 at a second end of the impact adapter 2. The impact adapter 2 is at the front end, a first end, provided with a thread 5 for connection to a drill string in the usual way. The grooves 8 are at the end 9 directed away from the first end of the impact adapter widened away from the

first end, which is shown by means of the angle  $v$ . Furthermore the ridges 7 have at the rear end 9 a somewhat smaller radial extension, which is shown by means of the angle  $u$ . Through this it is achieved that obliqueness between impact adapter and driver gives a lower surface pressure than what is obtained without these widened grooves. In the drawing the ridges 7 are formed in the same way at the end directed away from the end 9. The grooves widened towards the ends are suitably produced by feeding the milling tool milling the grooves 8 somewhat towards the centre of the impact adapter at the groove ends.

**Claims:**

1.           Impact adapter for transfer of impacts and rotation from an impact rock drilling machine to a drill string comprising a first end (5) for connection to a drill string and a second end provided with ridges (7) and interposed grooves (8) for transfer of rotation, c h a r a c t e r i z e d in that the grooves (8) at the end (9) directed away from the first end (5) of the impact adapter (2) are widened in the direction away from the first end (5).
  
2.           Impact adapter according to claim 1, c h a r a c t e r i z e d in that the ridges (7) at the end (9) directed away from the first end (5) of the impact adapter (2) has a smaller radial extension.



# INTERNATIONAL SEARCH REPORT

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PCT/SE 03/01423

## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E21B, B25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE 432460 B (FAGERSTA AB), 2 April 1984 (02.04.84) --	1-2
A	EP 0198809 A2 (ATLAS COPCO AKTIEBOLAG, NACKA), 22 October 1986 (22.10.86) --	1-2
A	EP 1077305 A1 (BOART LONGYEAR LIMITED), 21 February 2001 (21.02.01) --	1-2
A	US 6109620 A (N. ROBERTS ET AL), 29 August 2000 (29.08.00) -----	1-2

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer  Christer Bäcknert / MRo Telephone No. +46 8 782 25 00

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Information on patent family members

31/10/03

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
SE	432460	B	02/04/84	CA	1160214 A	10/01/84
				NO	152618 B,C	15/07/85
				NO	802118 A	04/05/81
				SE	7909103 A	03/05/81
EP	0198809	A2	22/10/86	AU	5594986 A	23/10/86
				BR	8601693 A	16/12/86
				CN	86102636 A	15/10/86
				FI	861571 A	17/10/86
				JP	61274081 A	04/12/86
				NO	861460 A	17/10/86
				SE	8501842 A	17/10/86
EP	1077305	A1	21/02/01	AU	5052600 A	08/02/01
				CA	2314834 A	03/02/01
				GB	2352671 A,B	07/02/01
				GB	9918197 D	00/00/00
US	6109620	A	29/08/00	AT	193747 T	15/06/00
				AU	1615297 A	10/09/97
				CA	2247842 A	28/08/97
				DE	69702242 D	00/00/00
				EP	0883733 A,B	16/12/98
				SE	0883733 T3	
				GB	2310391 A	27/08/97
				GB	9603732 D	00/00/00
				WO	9731176 A	28/08/97